Chapter 2
Simulation Examples

Banks, Carson, Nelson & Nicol
Discrete-Event System Simulation
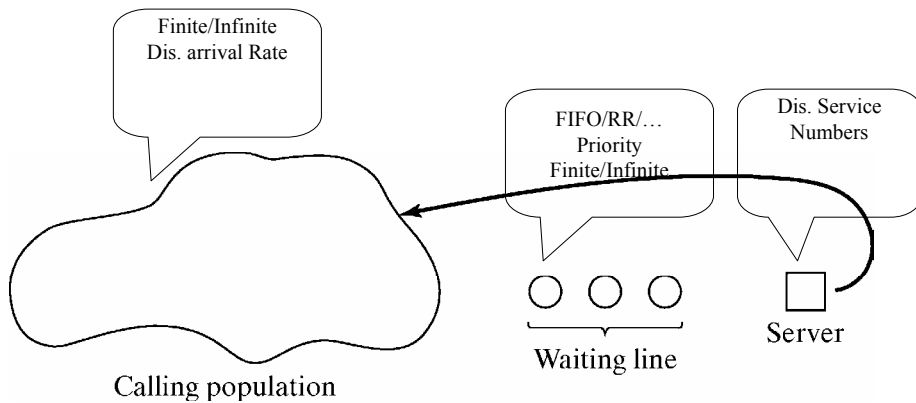

Simulation steps using Simulation Table

- Determine the characteristics of each of the inputs to the simulation (probability distributions).
- Construct a simulation table (repetition 1).
- For each repetition i, generate a value for the inputs, and evaluate function, calculating a value of response y_i.

Simulation table

	Inputs				Response
Repetitions	x_{i1}	x_{i2}	…	…	y_i
1					
2					
…					
n					

Simulation of Queuing System (Details in chapter 6)

Finite/Infinite
Dis. arrival Rate

FIFO/RR/…
Priority
Finite/Infinite

Dis. Service
Numbers

Server

Waiting line

Calling population

Single-Server Simulation

Customer in service

Arriving customer

Customers in queue

Server

Departing customer
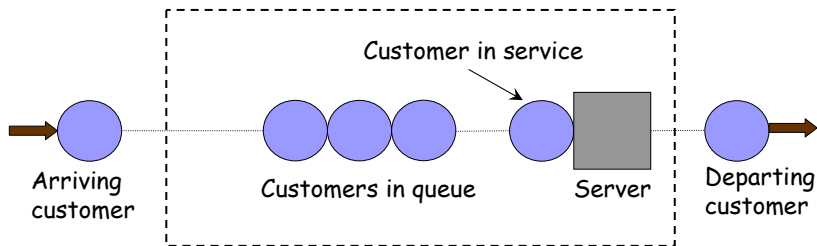
What are the events?

Service completion event

Departure event

Another unit waiting ?

No → Begin server idle time

Yes → Remove the waiting unit from the queue

Begin servicing the unit

Arrival Event

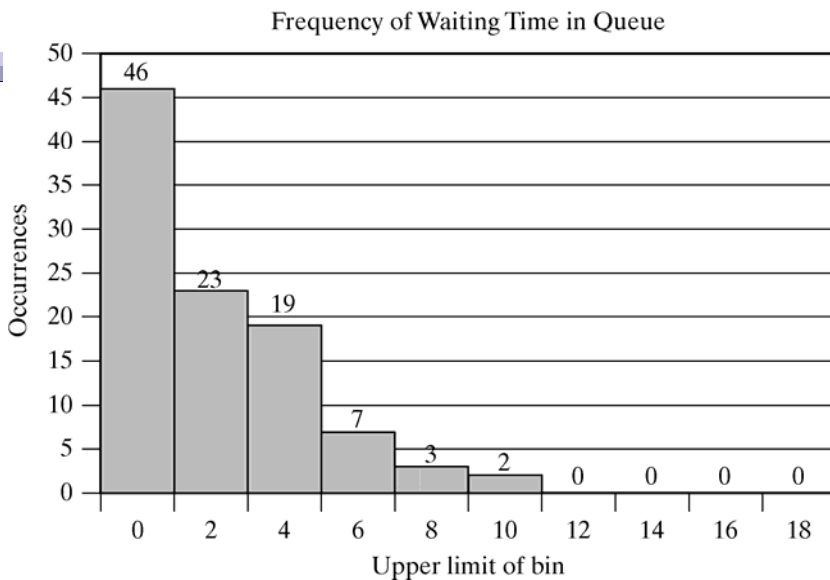|		Queue status	
		Not empty	Empty
Server status	Busy	Enter queue	Enter queue
	Idle	Impossible	Enter service
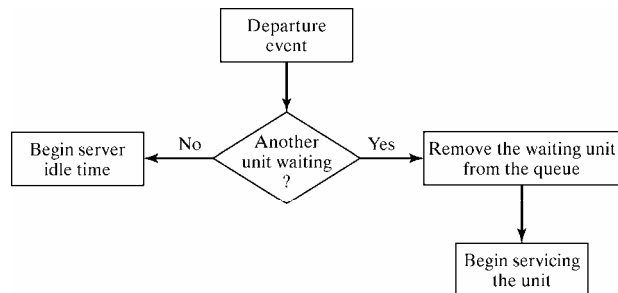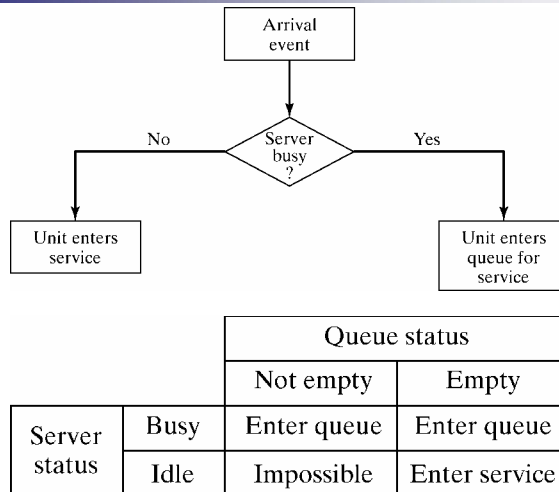
Example 2.1 : Grocery Center

- One checkout counter
- Arrival time between customers are 1 to 8 minutes (equal probability)
- Service time vary from 1 to 6 (service time table)
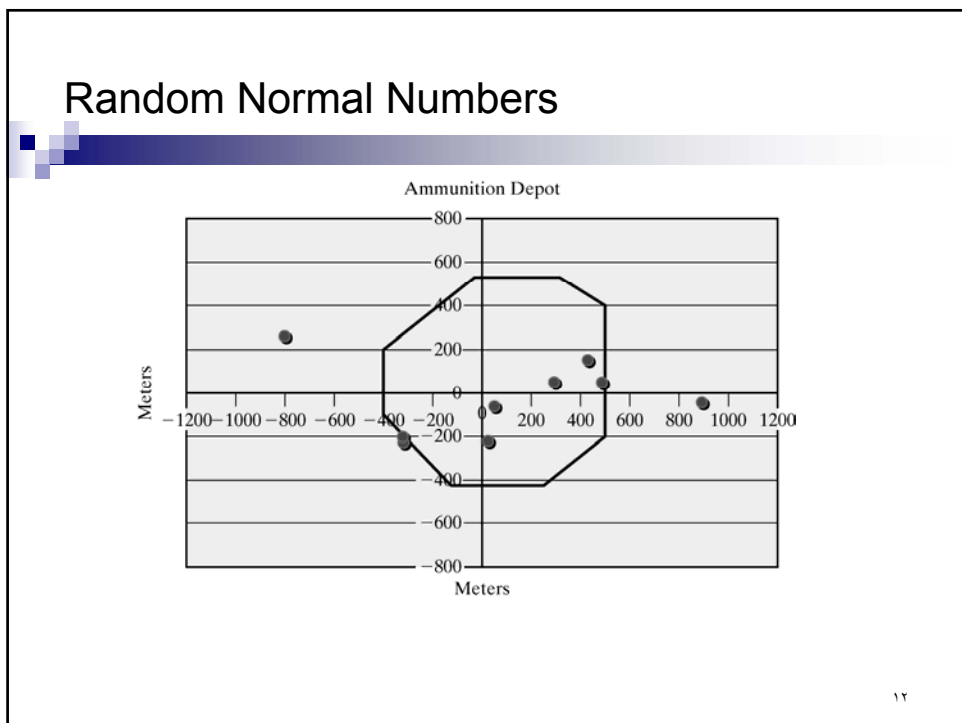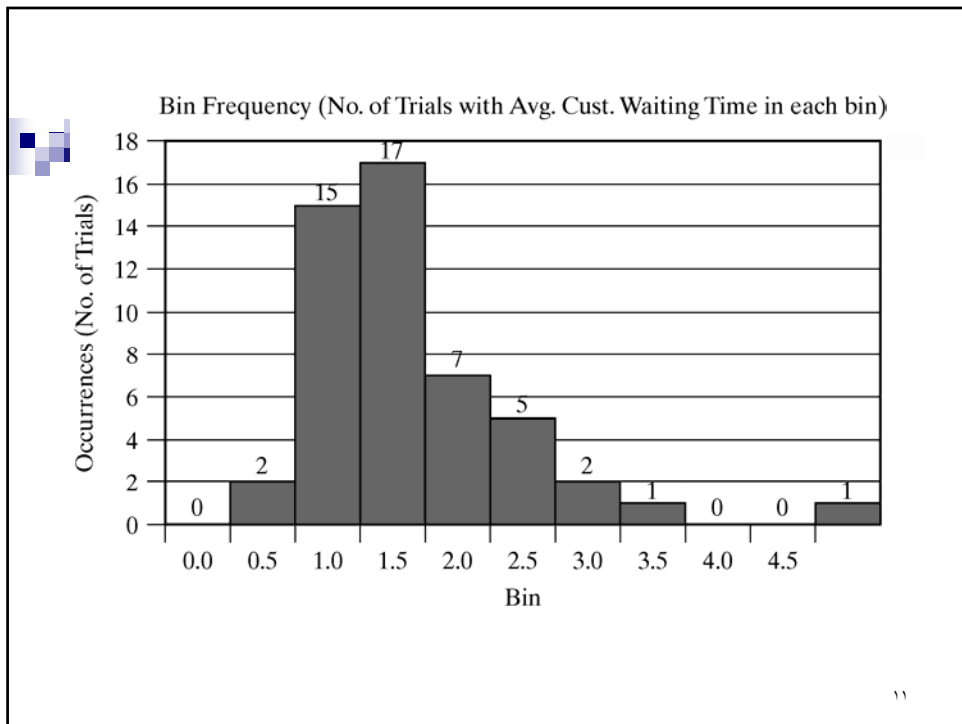- We are going to analysis for 100 customers.

Outputs

- Average waiting time=174/100=1.74 minutes
- The probability that a customer has to wait=0.46
- The proportion of idle time of the server=101/418=0.24
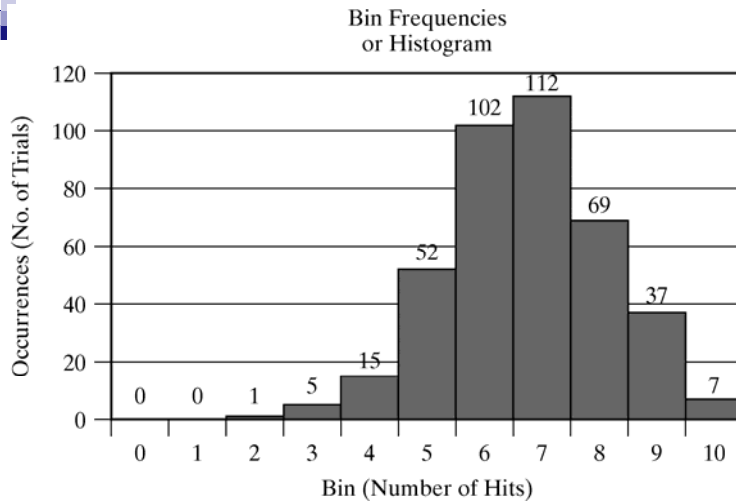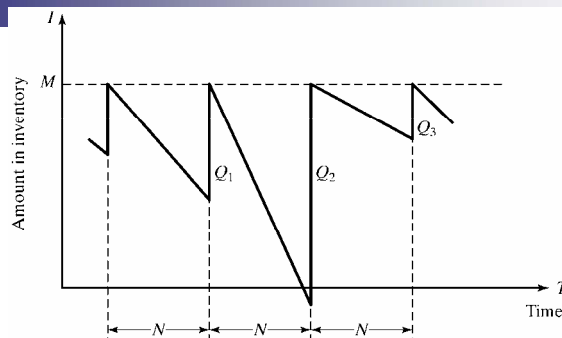- Average service time=317/100=3.17

Frequency of Waiting Time in Queue

Random Normal Numbers

Results of 400 Trials

Bin Frequencies or Histogram

Simulation of Inventory Systems

- N: Length of periodic review that inventory level is checked
  - □ An order is made to bring the inventory to the level M
- Lead Time: the length of time between the placement and receipt of an order (here is zero)
- Q: order quantity

Question

- How can we compute the π value?